

What is claimed is:

1. A detecting method for detecting a human face from an input image, comprising:

5 detecting candidate areas for an eye and candidate areas for an interval between eyes from luminance characteristics of the input image;

10 detecting an area of the interval between eyes from a positional relationship between the candidate areas for an eye and the candidate areas for an interval between eyes; and

determining a face area from the detected area of the interval between eyes.

15 2. The method according to claim 1, wherein the candidate areas for an eye are detected from the luminance characteristics of segments in nearly-horizontal directions.

20 3. The method according to claim 1, the candidate areas for an interval between eyes are detected from the luminance characteristics of areas with a small number of segments in the image.

4. The method according to claim 1, further comprising:

dividing a part or whole of the image into small areas;

25 detecting candidate small areas for an eye and candidate small areas for an interval between eyes from luminance characteristics of each of divided small

0970699-052501

areas;

examining whether each of the candidate small areas for an interval between eyes is present between two of the candidate small areas for an eye; and

5 detecting an area of the interval between eyes based on the examined result.

5. The method according to claim 4, wherein the candidate small areas for an eye are detected using edge information of pixels in the small areas.

10 6. The method according to claim 4, wherein the candidate small areas for an eye are detected by obtaining a luminance histogram of pixels in each of the small areas, and comparing the luminance histogram between adjacent small areas.

15 7. The method according to claim 4, wherein the candidate small areas for an interval between eyes are detected using edge information of pixels in the small areas.

20 8. The method according to claim 7, wherein the candidate small areas for an interval between eyes are detected using the edge information of pixels in the small areas adjacent each other in a vertical direction.

25 9. The method according claim 4, wherein the candidate small areas for an interval between eyes are detected by obtaining a luminance histogram of pixels in each of the small areas, and comparing the luminance histogram between adjacent small areas.

0970639.052501

10. A detecting method for detecting a human face from an input image, comprising:

dividing a part or whole of an image into a plurality of small areas;

5 classifying the small areas into at least two groups of the small areas in different ways;

detecting an area of an interval between eyes from luminance characteristics of an image of each of classified groups;

10 judging an overlap of the area of the interval between eyes to correct the area of the interval between eyes; and

determining a face area so that the face area includes the corrected area of the interval between eyes.

15 11. The method according to claim 10, wherein the small areas are classified into groups in different ways while moving a starting point for classifying so that a part of the small areas overlaps.

12. The method according to claim 10, wherein the small
20 areas are classified into groups in different ways so that sizes of the small areas are different between the groups.

13. The method according to claim 1, wherein the face
25 area is determined using colors contained in the area of the interval between eyes.

14. A detecting method for detecting a human face from an input image, comprising:

0970639.05501
T05350"6E90/60

detecting an area of an interval between eyes from luminance characteristics of the input image;

detecting candidate areas for both eyes so that the areas include the area of the interval between eyes;

5 examining luminance characteristics or shape characteristics of the candidate areas for both eyes to determine a position of a right eye and a position of a left eye; and

10 determining a face area so that the face area includes the position of the right eye and the position of the left eye.

15. The method according to claim 1, wherein information on a face in the face area is detected.

16. The method according to claim 15, wherein the
15 information on the face includes at least either one of a sex and an age.

17. A moving picture retrieval method, comprising:

20 detecting the face area using the method according to claim 1 from a frame picture of a moving picture;
 storing information on a face in each area; and
 retrieving a moving picture using the information on the face.

18. A face identifying method for identifying a face, comprising;

25 detecting the face area using the method according to claim 1; and

 identifying a face using a feature vector of a face

09/05/99 15:50:50

19. A detecting apparatus for detecting a human face from an input image, comprising;

an eye candidate detecting section that is configured to detect candidate small areas for an eye from luminance characteristics of the small areas;

an interval between eyes determining section that is configured to examine whether each of the candidate small areas for an interval between eyes is present between two of the candidate small areas for an eye to determine an area of the interval between eyes; and

20. The detecting apparatus according to claim 19,
further comprising:

25 a classifying section that is configured to
classifies the small areas into at least two groups of the
small areas in different ways while moving a starting

point for classifying so that a part of the small areas overlaps, in dividing the part or whole of the image into the plurality of small areas;

an interval between eyes area detecting section
5 that is configured to detect an area of the interval between eyes from luminance characteristics of an image of each of classified groups; and

an overlap judging section that is configured to
10 judge an overlap of a plurality of areas of the interval between eyes determined from each of classified groups in said interval between eyes area detecting section to correct the area of the interval between eyes;
wherein said face determining section determines a face
15 area so that the face area includes the area of the interval between eyes corrected in said overlap judging section.

21. The detecting apparatus according to claim 19, further comprising:

a classifying section that is configured to
20 classify the small areas into at least two groups of the small areas in different ways so that sizes of the small areas are different between the groups, in dividing the part or whole of the image into the plurality of small areas;

25 an interval between eyes area detecting section that is configured to detect an area of the interval between eyes from luminance characteristics of an image

T05250" 6590/650

of each of classified groups; and

an overlap judging section that is configured to judge an overlap of a plurality of areas of the interval between eyes determined from each of classified groups in said interval between eyes area detecting section to correct the area of the interval between eyes;

wherein said face determining section determines a face area so that the face area includes the area of the interval between eyes corrected in said overlap judging section.

22. The detecting apparatus according to claim 19, wherein said face determining section determines the face area using colors contained in the area of the interval between eyes.

23. A detecting apparatus for detecting a human face from an input image, comprising:

an interval between eyes detecting section that is configured to detect an area of an interval between eyes from luminance characteristics of the input image;

an eye candidate setting section that is configured to detect candidate areas for both eyes so that the areas include the area of the interval between eyes detected in said interval between eyes detecting section;

an eye determining section that is configured to examine luminance characteristics or shape characteristics of the candidate areas for both eyes detected in said eye candidate setting section to

determine a position of a right eye and a position of a left eye; and

5 a face determining section that is configured to determine a face area so that the face area includes the position of the right eye and the position of the left eye determined in said eye determining section.

24. A moving picture retrieval apparatus comprising:

a moving picture storage section that is configured to store moving pictures;

10 the detecting apparatus according to claim 19 that determines a face area from a frame picture of the moving pictures;

15 an information detecting section that is configured to detect information on a face in the determined face area;

a face information storage section that is configured to store information detected in said information detecting section; and

20 a retrieval section that is configured to retrieve the information stored in said face information storage section.

25. A face identifying apparatus comprising;

the detecting apparatus according to claim 19 that determines a face area from the input image;

25 a database section that is configured to store in advance feature vectors of faces and names of persons to be identified; and

an identifying section that is configured to identify a face using a feature vector of a face in each area determined in said detecting apparatus that detects a human face and the feature vectors of faces stored in said database section.

26. A computer readable storage medium with a detecting program stored therein, said program being executed by a computer to detect a human face from an image, said program comprising:

10 detecting candidate areas for an eye and candidate areas for an interval between eyes from luminance characteristics of the input image;

detecting an area of the interval between eyes from a positional relationship between the candidate areas for an eye and the candidate areas for an interval between eyes; and

determining a face area from the detected area of the interval between eyes.

27. A computer readable storage medium with a detecting program stored therein, said program being executed by a computer to detect a human face from an image, said program comprising:

detecting an area of an interval between eyes from luminance characteristics of the input image;

25 detecting candidate areas for both eyes so that the areas include the area of the interval between eyes; examining luminance characteristics or shape

09/05/94 10:55:01

characteristics of the candidate areas for both eyes to determine a position of a right eye and a position of a left eye;

determining a face area so that the face area
5 includes the position of the right eye and the position of the left eye; and

outputting the determined face area.

28. A computer readable storage medium with a moving picture retrieval program stored therein, said program
10 being executed by a computer to retrieve a moving picture, said program comprising:

detecting a face area according to the detecting method according to claim 1 from a frame picture of a moving picture;

15 storing information on a face in each area from the detected face area; and

retrieving a moving picture using the information on the face.

29. A computer readable storage medium with a face
20 identifying program stored therein, said program being executed by a computer to identify a face, said program comprising:

detecting a face area according to the detecting method according to claim 1; and

25 identifying a face using a feature vector of a face in each detected face area and feature vectors of faces stored in advance in a database.

TOP SECRET